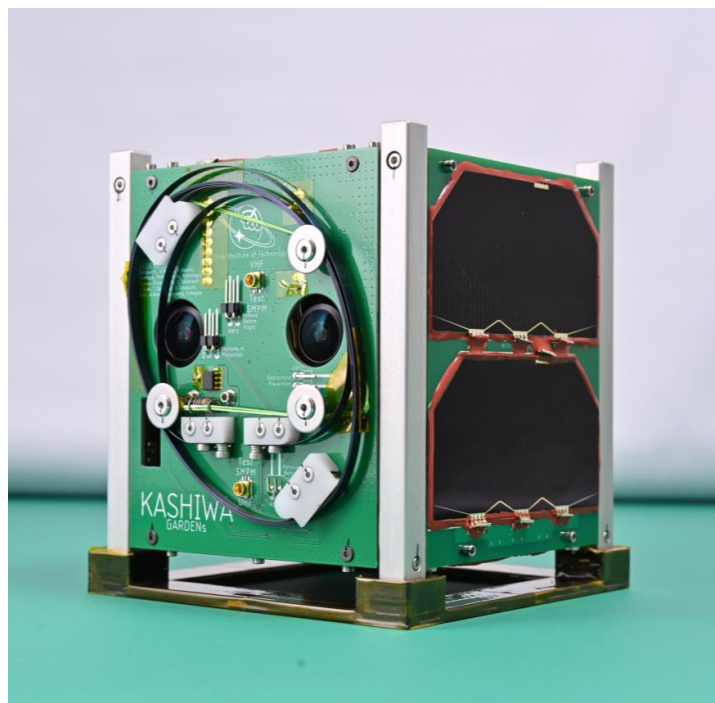




KASHIWA initial operation report



Tetsuro Harada
Chiba Institute of Technology
2024/6/12



Scope



- This document summarize a report of KASHIWA initial operation

Success Criteria

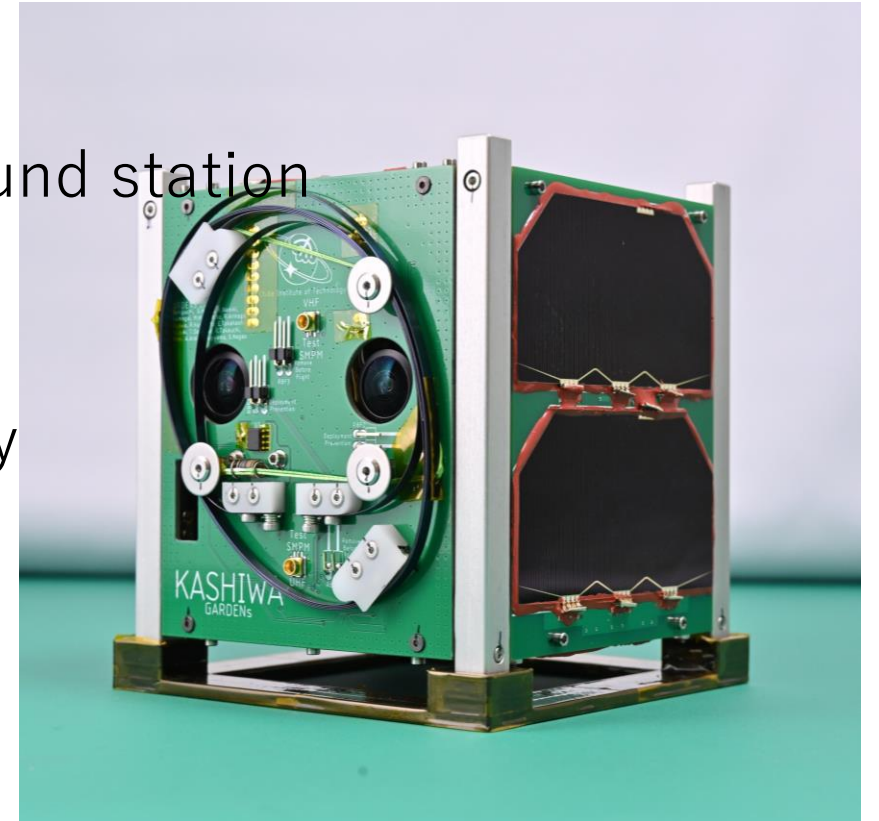


Minimum Success Criteria

- APRS communication
- Taking photo of any object and decode a file on ground station

Full Success Criteria

- Provide a music of geomantic to amateur community
- Taking a photo following location
 - The Banc d'Arguin National Park in west africa
 - garbage belt in pacific ocean
 - Kanto region at night
- Taking photos of ISS with stereo camera



Ground Station

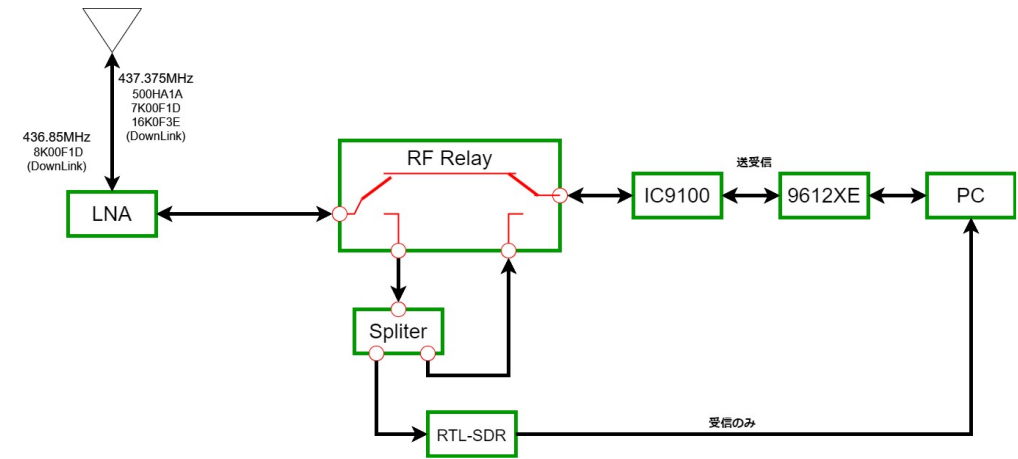


- Antenna tower configuration
 - 20 Element Yagi for UHF
 - V/H switcher for both VHF/UHF
 - 20dB pre-amp for both VHF/UHF
 - 9 Element Yagi for VHF
 - Anemometer
 - Handle elevator
 - Lightning rod

Ground Station



- Advised by JAMSAT for bi-directional receiving

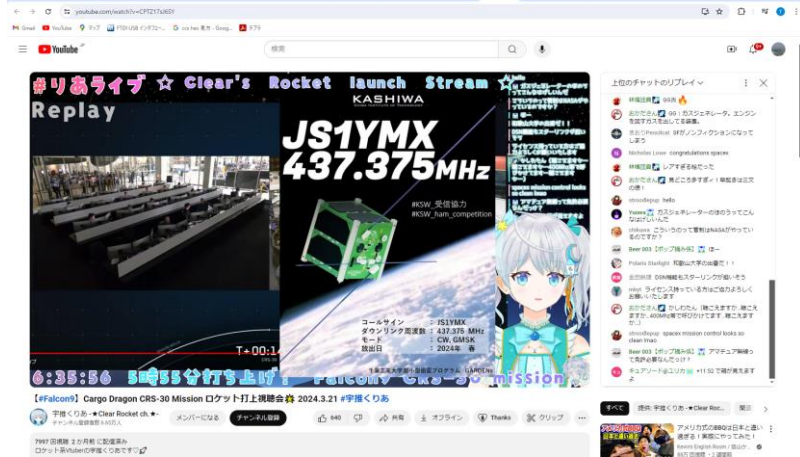


- S/W configuration
 - SDR console
 - CW Get
 - Gardens GS S/W
 - AWG Online kiss Plus
 - HS sound modem
 - Wisp DEE
 - VB-Audio
 - YAMAHA SYNCROOM
 - VIGI Security Manager

Preparation for Operation



- Dryrun with EM for document clarification
- On-orbit satellite signal receiving
 - KKS-1
 - Clarksat-1
 - KOSEN-SAT1
 - PRISM
 - ISS
- Out-reach
 - JAMSAT meeting
 - Characters “KASHIWA-TAN”
 - Shared e-Mail
 - QSL
 - Public viewing
 - Contacting Vtuber “Usui Clear”



SNS outreach



KASHIWA
CHIBA INSTITUTE OF TECHNOLOGY

JAPAN JS1YMX

To SWL PI9CAM

We confirm your reception of KASHIWA signal from Lower Earth Orbit.
Thank you for your Reception!

Date	UTC	COUNTRY	FREQ[MHz]	MODE
19/04/2024	05:47:09	The Netherlands	437.375	CW GMSK

CHIBA INSTITUTE OF TECHNOLOGY
Tsudanuma Campus, CHIBA, JAPAN

ありがとう

KASHIWA
CHIBA INSTITUTE OF TECHNOLOGY

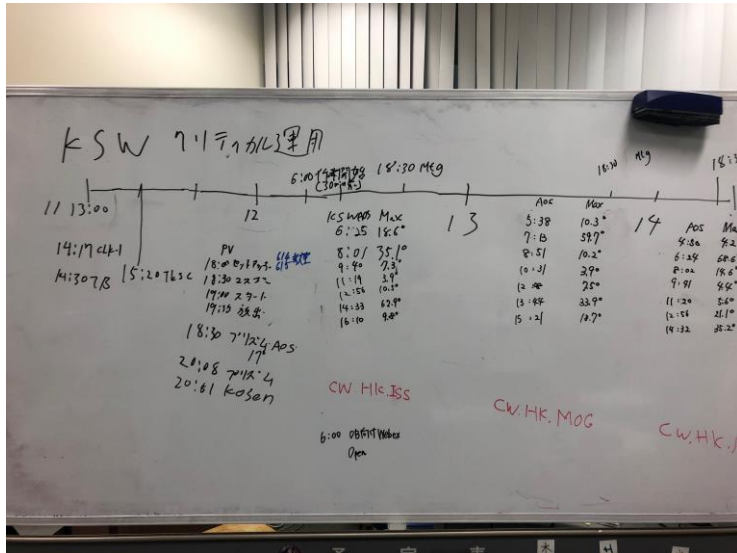
JS1YMX
437.375MHz

コールサイン : JS1YMX
ダウンリンク周波数 : 437.375 MHz
モード : CW, GMSK

千葉工業大学 超小型衛星プログラム GARDENS

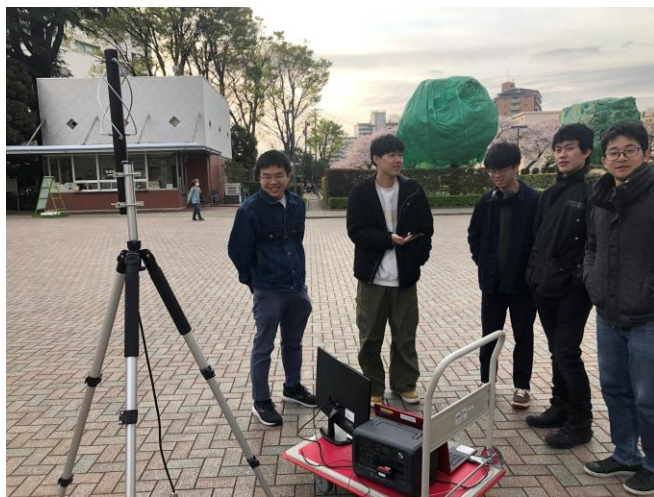


Critical Phase Initial Phase



- Critical phase
 - The first 1 week from ISS release
 - To establish commutation
 - GS + Omuni-ant GS
 - Day and night operation
 - Daily meeting
 - High-windy operation <10m/s
 - Low elevation operation >0

- Initial phase
 - The next 1 week after critical phase
 - To accomplish minimum success criteria and frequency inspection dry-run
 - Day time operation
 - Daily meeting
 - Hi-windy operation
 - Low elevation operation >0
 - Followed by nominal operation phase



Until first AOS



- Release KASHIWA on April 11th



Until first AOS



- Release KASHIWA on April 11th
 - No signal
 - SATNOGS: All red



Observations

Status: [Icons] Satellite: 99197 - Kashiwa Start Time: End Time: [Input fields] Search

Show More Filters

ID	Satellite	Frequency	Mode	Timeframe	Results	Observer	Station
ES4882	Kashiwa	437.375 MHz	GMSK 4800	2024-04-11 13:45:55 2024-04-11 13:56:40	40	Fredy Damkalis	310 - CSFD-VA3TZA
ES4883	Kashiwa	145.825 MHz	FSK AX.25 G3RUH 1200	2024-04-11 13:45:43 2024-04-11 13:56:25	40	Fredy Damkalis	2575 - KC3QHU
ES4884	Kashiwa	437.375 MHz	GMSK 4800	2024-04-11 13:45:31 2024-04-11 13:56:17	40	Fredy Damkalis	2617 - KZPI
ES4885	Kashiwa	437.375 MHz	GMSK 4800	2024-04-11 13:45:27 2024-04-11 13:56:13	40	Fredy Damkalis	201 - KD2F-LHF-1
ES4886	Kashiwa	437.375 MHz	GMSK 4800	2024-04-11 13:45:23 2024-04-11 13:56:13	40	Fredy Damkalis	1363 - EX-ENVO-LHF
ES4887	Kashiwa	437.375 MHz	GMSK 4800	2024-04-11 13:45:15 2024-04-11 13:55:57	40	Fredy Damkalis	1132 - WD88Z - 70m
ES4888	Kashiwa	437.375 MHz	GMSK 4800	2024-04-11 13:45:12 2024-04-11 13:55:52	40	Fredy Damkalis	2931 - MXL CSRB Station
ES4889	Kashiwa	437.375 MHz	GMSK 4800	2024-04-11 13:45:10 2024-04-11 13:55:56	40	Fredy Damkalis	663 - KBANKO - Jonesboro, VA, US LHF
ES4890	Kashiwa	437.375 MHz	CW	2024-04-11 13:45:01 2024-04-11 13:54:18	40	Fredy Damkalis	3188 - NONGQ-SatScanner
ES4891	Kashiwa	437.375 MHz	GMSK 4800	2024-04-11 13:44:47 2024-04-11 13:55:36	40	Fredy Damkalis	216 - CWVRP/UHF
ES4892	Kashiwa	437.375 MHz	GMSK 4800	2024-04-11 13:44:36 2024-04-11 13:55:06	40	Fredy Damkalis	336 - Chicago2
ES4893	Kashiwa	437.375 MHz	GMSK 4800	2024-04-11 13:44:28 2024-04-11 13:55:07	40	Fredy Damkalis	642 - kbtk
ES4894	Kashiwa	145.825 MHz	FSK AX.25 G3RUH 1200	2024-04-11 13:44:14 2024-04-11 13:54:58	40	Fredy Damkalis	2 - KB3HU
ES4895	Kashiwa	437.375 MHz	GMSK 4800	2024-04-11 13:43:55 2024-04-11 13:54:42	40	Fredy Damkalis	2461 - N7ESK-Loudon
ES4896	Kashiwa	437.375 MHz	GMSK 4800	2024-04-11 13:43:35 2024-04-11 13:54:14	40	Fredy Damkalis	1519 - Not Quite ESL
ES4897	Kashiwa	437.375 MHz	GMSK 4800	2024-04-11 13:43:22 2024-04-11 13:54:01	40	Fredy Damkalis	1213 - KEORW2-Mow-PC
ES4898	Kashiwa	437.375 MHz	GMSK 4800	2024-04-11 13:43:19 2024-04-11 13:54:07	40	Fredy Damkalis	2097 - KJ4YV
ES4899	Kashiwa	437.375 MHz	GMSK 4800	2024-04-11 13:43:04 2024-04-11 13:53:50	40	Fredy Damkalis	1442 - KCALE 2m/70m Open Stub J-Pole
ES4900	Kashiwa	437.375 MHz	GMSK 4800	2024-04-11 13:42:53 2024-04-11 13:53:40	40	Fredy Damkalis	2303 - Rhodes College
ES4901	Kashiwa	145.825 MHz	FSK AX.25 G3RUH 1200	2024-04-11 13:41:37 2024-04-11 13:52:24	40	Fredy Damkalis	760 - KD5QZG-VHF/UHF

<https://network.satnogs.org/observations/?norad=99197&page=170>

Until first AOS

- FTA

品名	品番	品名	品番	品名	品番
...

品名	品番	品名	品番	品名	品番
...

品名	品番	品名	品番	品名	品番
...




Until first AOS





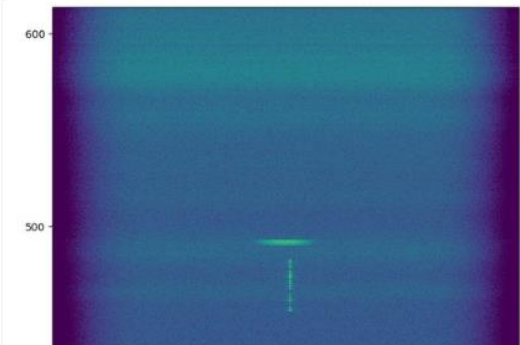
- Apr 17th PA0DLO in Holand
- Apr 19: Dwingeloo telescope confirmed KASHIWA signal
 - PA0DLO contact to Dwingeloo manager
- Apr 20: JA1OGZ: report a weak signal in Japan
- Apr 21: JM2FCJ: report a strong signal in Japan


2024-04-17 18:32:43


 PA0DLO @HAMSATNL
Doppler measurements show that Kashiwa is object 59508 (1998-067WH).
Frequency: 437.3794 MHz.
[@SpaceTrackOrg](#) [@18thSDS](#) [@TSKelso](#) [@planet4589](#) [@AMSAT](#) [@AmsatUK](#) [@CitGardens](#)

2024-04-17 18:43:36

 pi9cam @PI9CAM
The Dwingeloo @radiotelescoop just observed the satellite Kashiwa as a @SatNOGS ground station (while tracking the satellite). View the results at network.satnogs.org/observations/9...
pic.twitter.com/Ha4MhHLQaw



 ja1ogz @ja1ogz
2024/04/20 11:07 JST の千葉工大の衛星KASHIWAの受信を試みました。 MELが42度であったのCWの信号確認はできました。2回ほどCWが聞こえましたが解読出来るような強さではなかったです。SDR Consoleでは4dBほどノイズレベルよりも高い程度でした。よく見ないと確認出来ないほどです。#KASHIWA
pic.twitter.com/WzPTRcrtVv

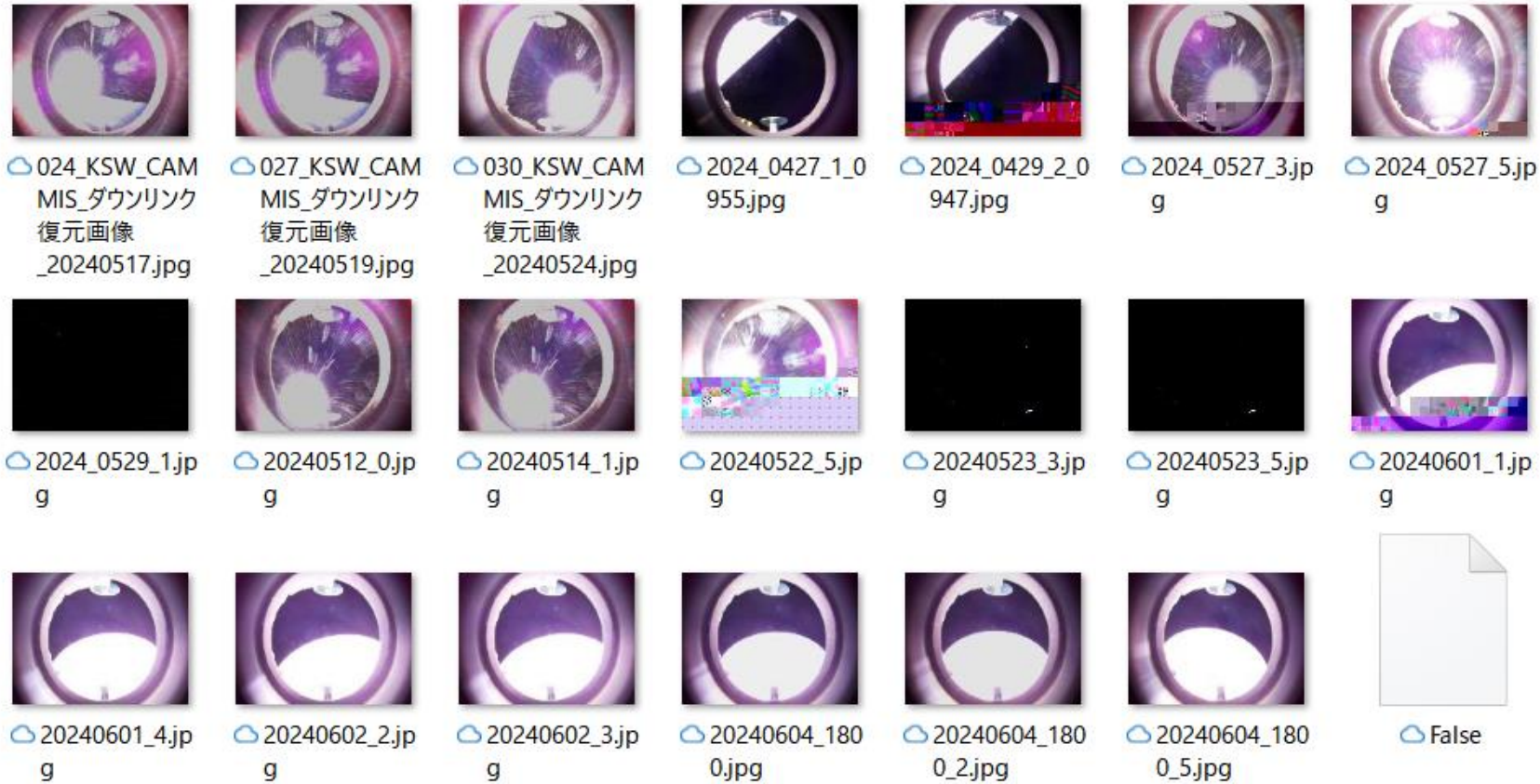
 jm2fcj/天, Hiro @jm2fcj
[@CitGardens](#) おめでとうございます。
だれでも簡単に受信できるレベルになりました🎉

Until first AOS



- Expected root cause is antenna that did not deployed fully
- By thermal input, antenna deployed

Minimum success Photo



- Minimum success criteria is complied
- Halation occurred at the earth portion

CAM



20240601_1.jpg



20240602_2.jpg



20240602_3.jpg



20240601_4.jpg

攝影順

- Interval 1 sec (interval time should have changed)
- Over exposure

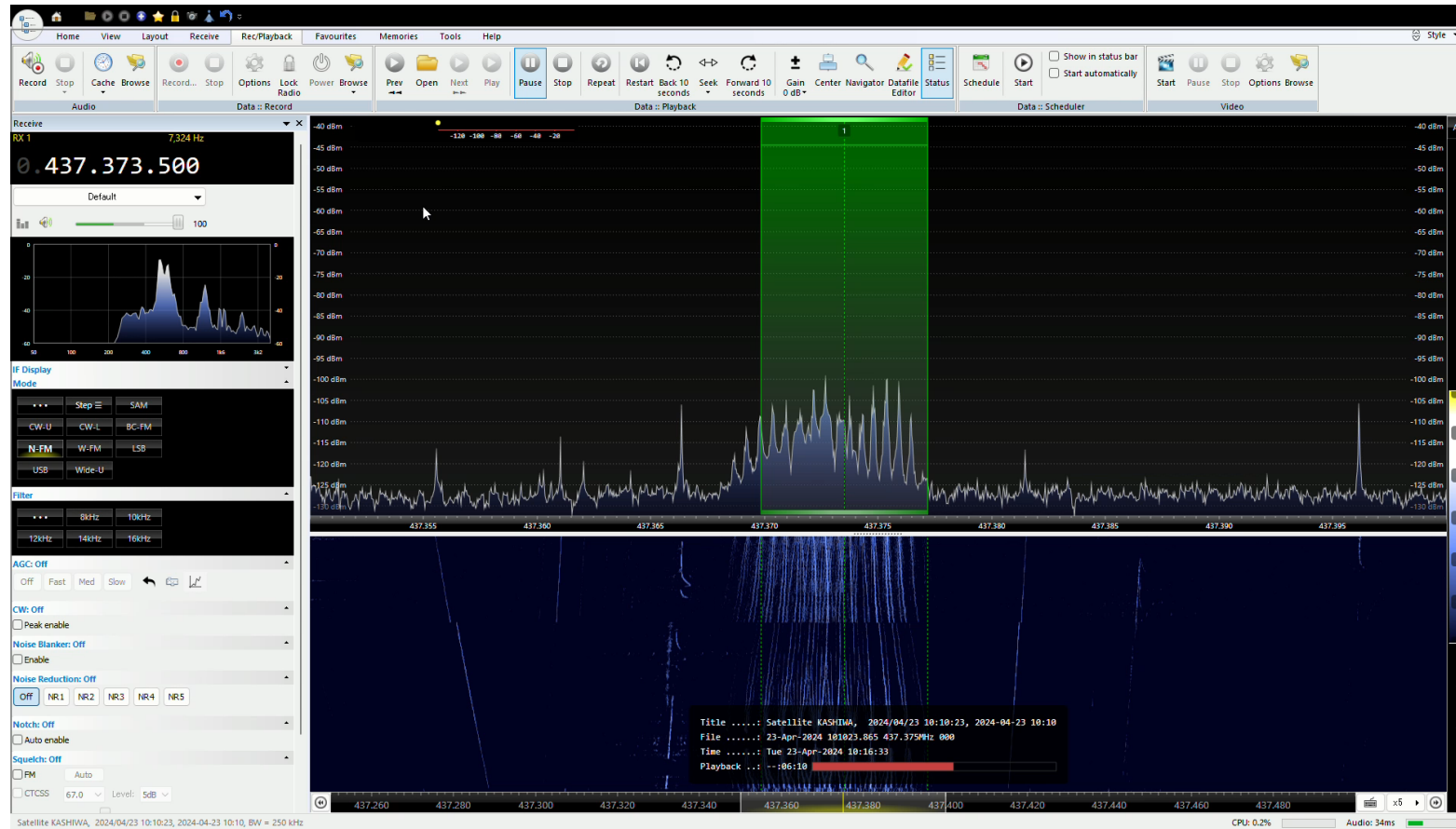
Minimum success APRS



```
JS1YMX audio level = 11(2/1)  ___|_____  
[0.3] JS1YMX>APTT4,WIDE1-1:>KASHIWA is cubesat designed by CIT Chiba Institute of Technology.<0x0d>  
Status Report, Tiny Track  
KASHIWA is cubesat designed by CIT Chiba Institute of Technology.
```

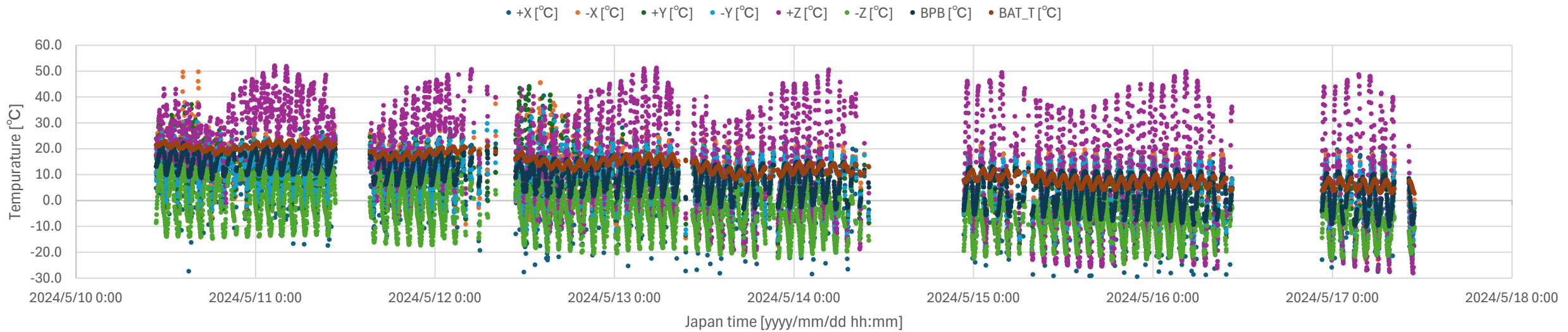
- There is anomaly at CIT ground station
 - Even ISS APRS signal was weak at CIT ground station
- Kyutech ground station received APRS beacon on May 29th
 - Thank you for your support

MoG mission



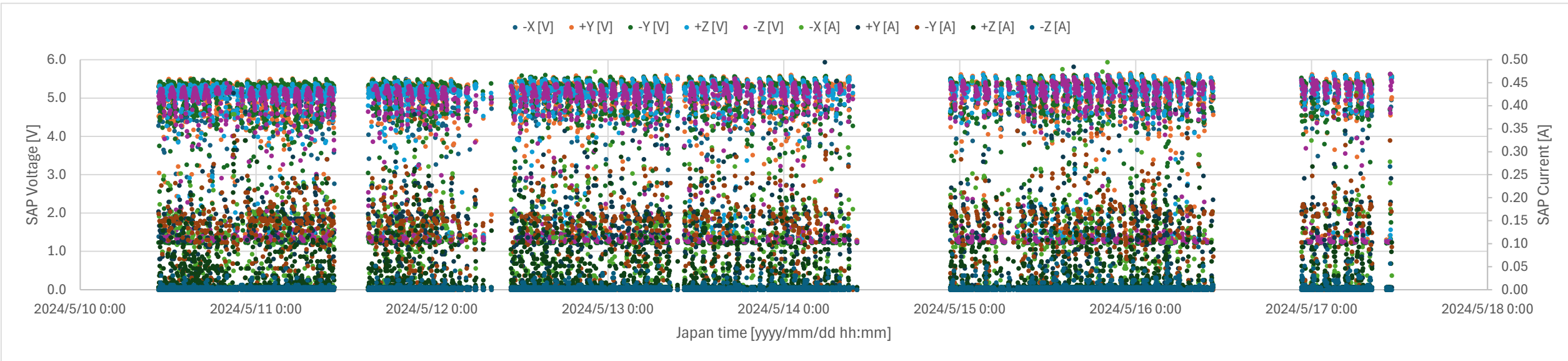
- Sound change due to attitude.

HK Temperature



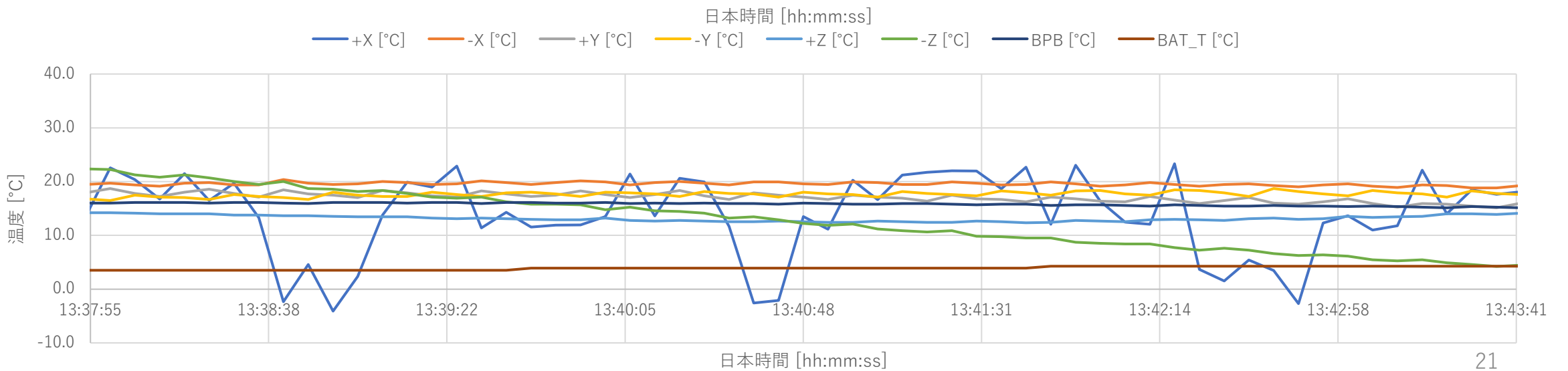
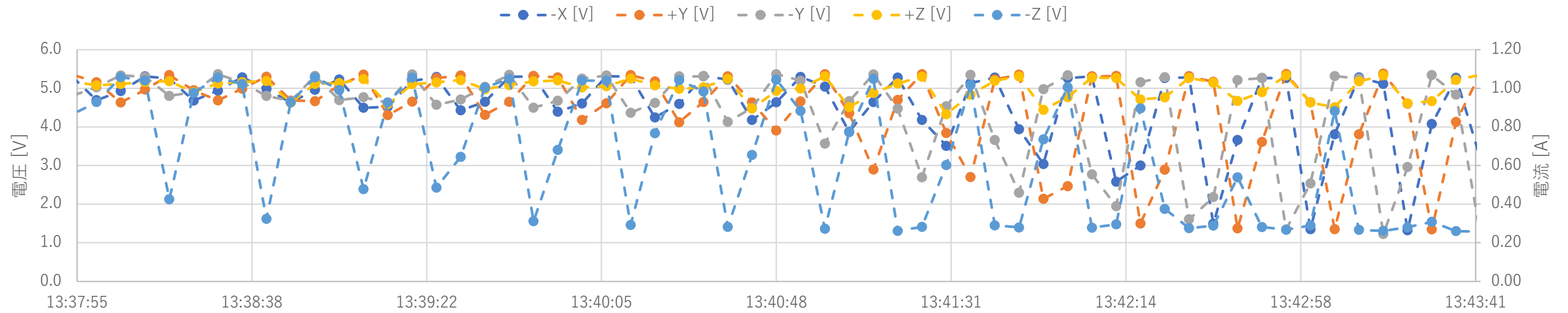
- Temperature was within thermal design

HK SAP

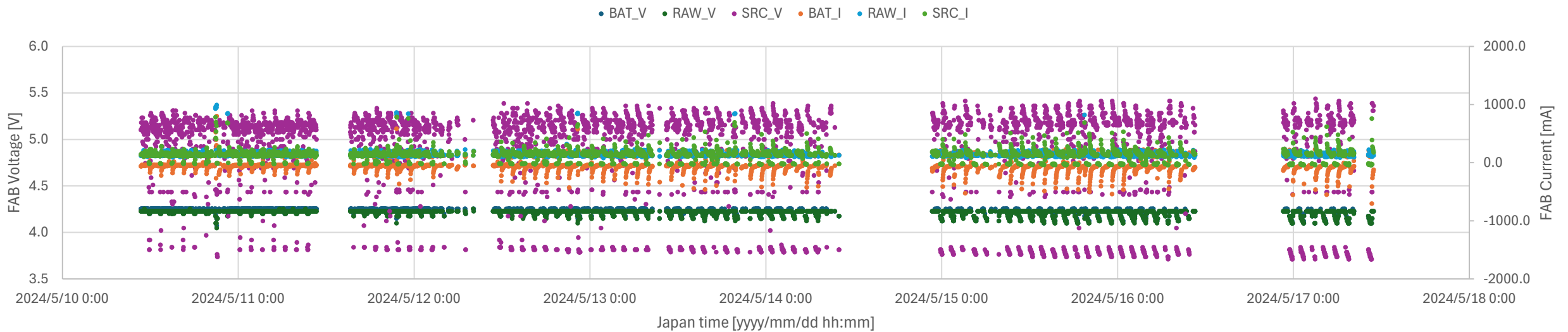


- Within expectation

HK HS SAP



HK charge discharge

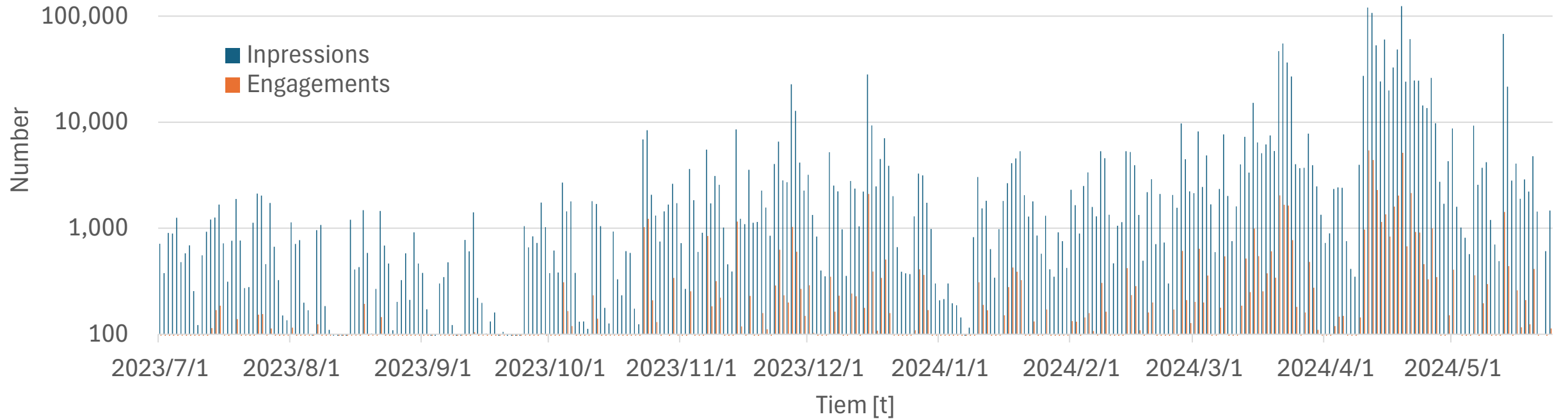


- BAT I, RAW I, SRC was within expectation

Impact



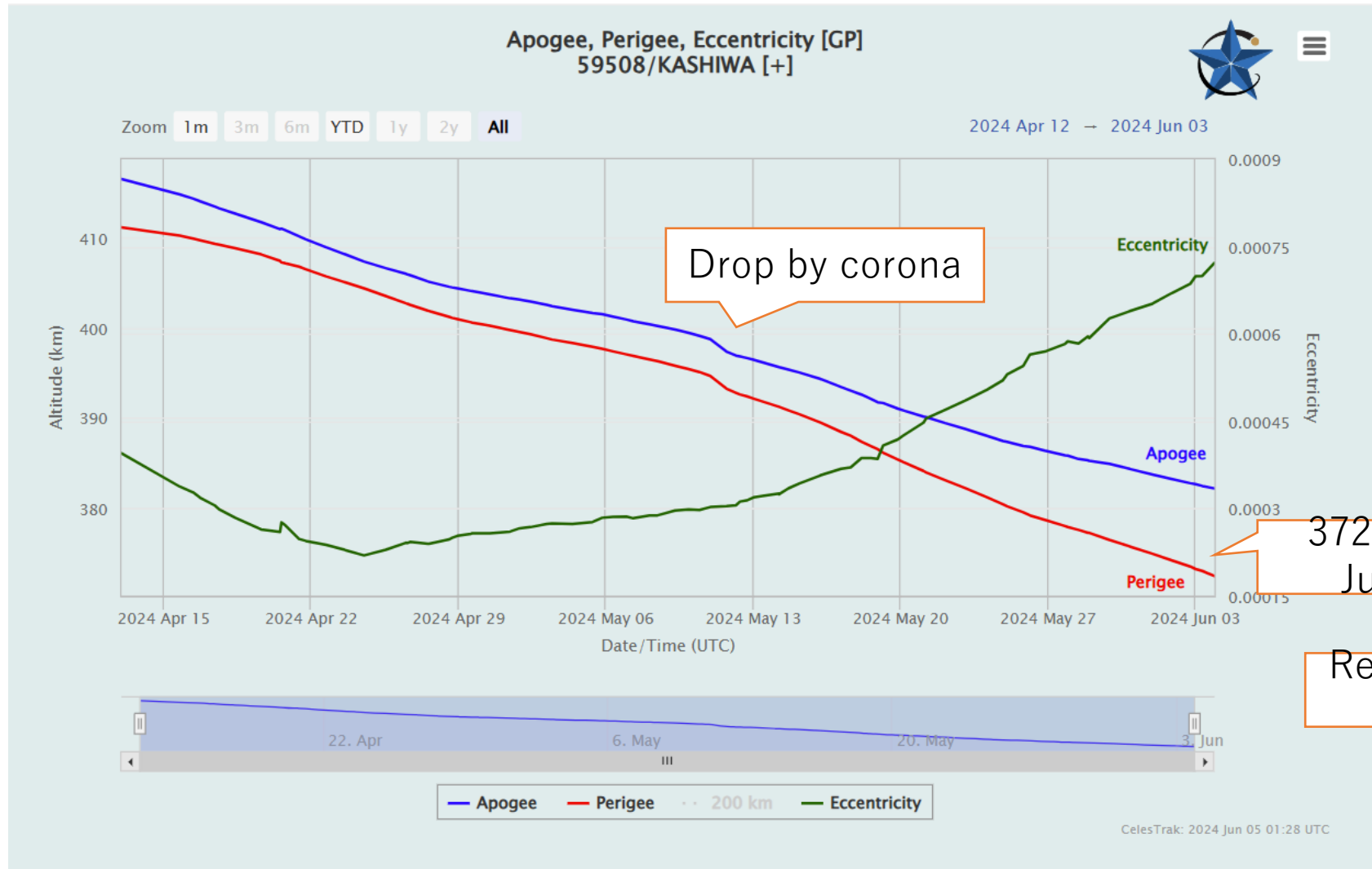
Gardens X Impressions and engagements



ISS crew photography



Altitude



372km as of June 3rd

Reentry middle of July

Operation note



- Nominal sequence: After 5 times above sequence, Auto GMSK packet will be transmitted.
- Frequency: 437.375 for UHF, 145.825 for APRS
- Data format
 - https://sites.google.com/view/gardens-02/english_ver/document/transmission-format
- Operation hour: daytime in Japan or scheduled reserved command
 - For daily plan, see X.com (<https://x.com/CitGardens>)

Lessons and learned



The screenshot shows the SatNOGS Observations page. The search filter is set to Satellite: 59508 - Kashiwa. The table below lists several observations:

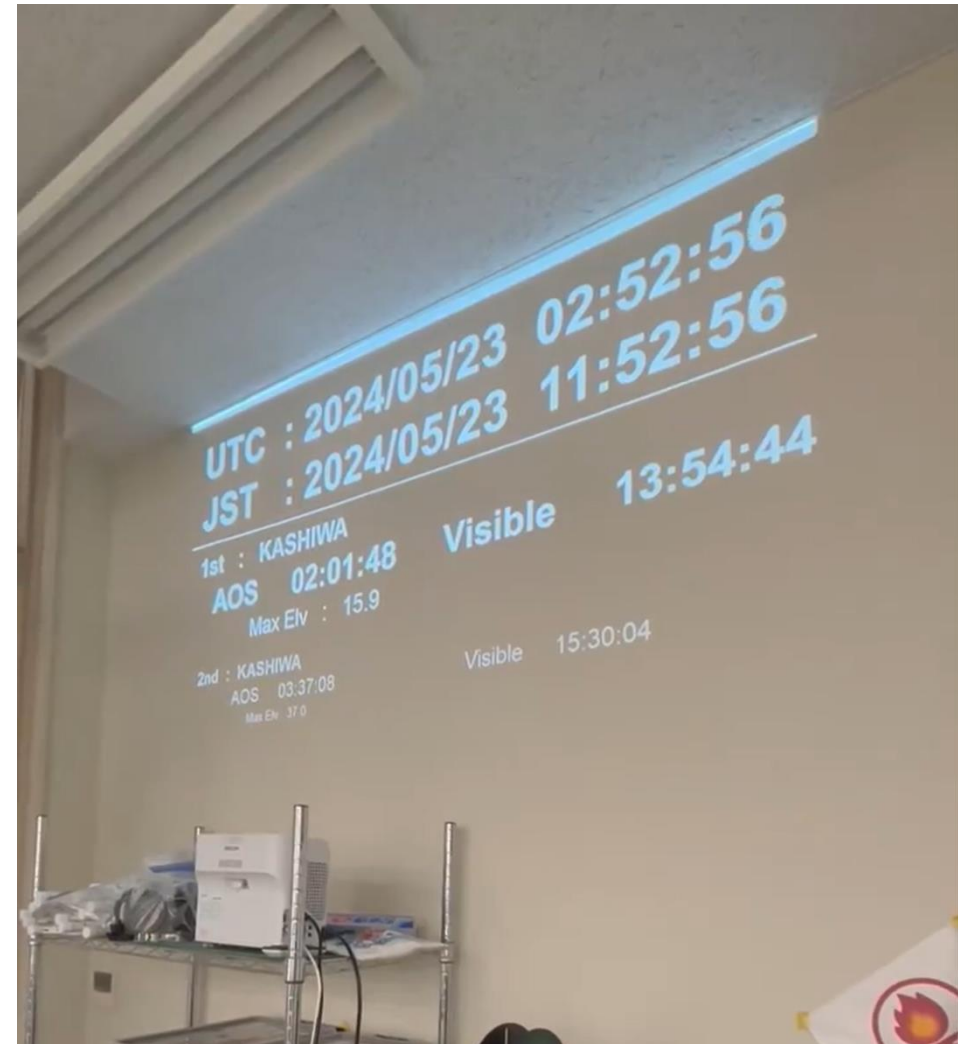
ID	Satellite	Frequency	Mode	Timeframe	Results	Observer	Station
9684426	Kashiwa	437.375 MHz	GMSK 4800	2024-06-12 09:58:02 2024-06-12 10:06:03	[Icons]	UXSUL Oleg Soroka	2968 - UXSUL
9676910	Kashiwa	437.375 MHz	GMSK 4800	2024-06-12 08:20:53 2024-06-12 08:27:03	[Icons]	ENSFNM	2138 - OM7AAK
9679644	Kashiwa	437.375 MHz	GMSK 4800	2024-06-12 06:43:40 2024-06-12 06:51:04	[Icons]	Fredy Damkalis	2173 - PE0SAT-21
9673138	Kashiwa	145.825 MHz	AFSK 1200	2024-06-12 06:43:38 2024-06-12 06:51:03	[Icons]	Fredy Damkalis	2176 - PE0SAT-22
9679616	Kashiwa	437.375 MHz	GMSK 4800	2024-06-12 06:39:32 2024-06-12 06:48:56	[Icons]	Fredy Damkalis	342 - EASWA Pobla Llarg
9679645	Kashiwa	437.375 MHz	GMSK 4800	2024-06-12 06:14:52 2024-06-12 06:25:00	[Icons]	Fredy Damkalis	2178 - DIYSATELLITE
9679642	Kashiwa	437.375 MHz	GMSK 4800	2024-06-12 05:29:42 2024-06-12 05:39:54	[Icons]	Fredy Damkalis	2152 - Tokorozawa VUHF-Discone
9679643	Kashiwa	437.375 MHz	GMSK 4800	2024-06-12 05:27:54 2024-06-12 05:37:44	[Icons]	Fredy Damkalis	2159 - ITSDLab SatNOGS
9679660	Kashiwa	437.375 MHz	GMSK 4800	2024-06-12 05:11:21 2024-06-12 05:19:35	[Icons]	Fredy Damkalis	2968 - UXSUL
9676920	Kashiwa	437.375 MHz	GMSK 4800	2024-06-12 05:10:51 2024-06-12 05:16:22	[Icons]	ENSFNM	3052 - GUMUSH Ground Station
9683101	Kashiwa	437.375 MHz	GMSK 4800	2024-06-12 02:01:38 2024-06-12 02:08:06	[Icons]	NitinKumar Muttin	2987 - VU3TYG_Nitin

- Ground station software: to be more auto
- More outreach
 - poster all over campus
 - Tweet in English more
 - Web technical note
 - IICD (Packet format, CW)
 - Sequence
 - Packet analysis
 - FM specification
 - Handbook: for off-nominal operation
 - Data compilation (folder by subsystem, system)
 - Daily log in detail.
- SATNOGOS
 - We don't use satnogs data a lot.
- Need Beds for critical phase

AOS timer



- Following information is very convenient to discuss internally
 - UTC: to consider SATNOGS plan
 - Local time: for work shift
 - AOS timer: for time planning
- Same picture and same page is very important
- CIT build a software on right.
 - Displaying 24hours with projector



evaluation



- Great experience
- Cooperation all ages around the world
- Enjoy satellite operation

Conclusion



- Summarizing KASHIWA initial operation report
- KASHIWA is healthy
- Great experience

Appendix GS hardware

